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Administrivia

- Reminder: Homework 5 due today. Homework 6 due Friday. “Not accepted past” date for all homeworks will be next Monday at 5pm.
- Final is December 17 at 8:30am. Review sheet on Web. Solutions to all homeworks will be available next Monday.
- Short review session December 16 at 12:30pm. Location TBA.
- Extra-credit problems to be on Web soon; due the day of the final.
- Syllabus says “about 300” points for homework. Actually only 170.
- Information about office hours this week and next coming by e-mail soon.

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Course Recap

- Four key areas (the gospel according to Pitts):
 - Process management.
 - Memory management.
 - I/O management.
 - Filesystem management.
- Two views of operating systems:
 - “Virtual machine” that provides useful abstractions for applications programs, end users.
 - Resource manager.
- Also a little about history, a little about security.

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Process Management

- O/S as virtual machine — process abstraction, “concurrent” execution, IPC, concurrent algorithms.
- O/S as resource manager — implementation of above, including interrupts and context switches, CPU scheduling.

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Memory Management

- O/S as virtual machine — memory protection, virtual memory, “multiprogramming”.
- O/S as resource manager — implementation of above, including page replacement algorithms.

Filesystem Management

- O/S as virtual machine — filesystem abstractions (files, file attributes, directory structures).
- O/S as resource manager — implementation of above, disk-space management, reliability and consistency.

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I/O Management

- O/S as virtual machine — layered abstractions for working with I/O devices (user-level s/w, device-independent s/w).
- O/S as resource manager — implementation of above, plus a little about lower-level interaction with devices (programmed versus interrupt-driven I/O versus DMA).

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Recap, Continued

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- Some recurring themes:
 - Interaction between h/w and s/w — some h/w features are there to support o/s features; o/s influenced by what's available in h/w.
 - Trade-offs — often the answer to “which is best?” is “it depends”.
- We didn't cover the whole book, but if you look at the ACM's guidelines for an undergrad o/s course — we pretty much did what they said.

Recap, Continued

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- A very smart person I know once said the only interesting part of an o/s course was concurrent algorithms, and the rest is “just details”.
A student a few years ago said “a lot of this just seems like common sense” (once you understand the basic ideas).
Both sort of right . . .
- Goal of this course is to learn/retain basic ideas. Details may help with that — and can be interesting in themselves — but should not be the focus.

Minute Essay

- How did the course compare to your expectations/goals? Did you learn what you hoped to learn?

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